US005772032A

United States Patent [19]

Goldman

[11] **Patent Number: 5,772,032**

[45] **Date of Patent: Jun. 30, 1998**

[54] **CORRUGATED BOX WITH EXTERIORALLY SUPPORTED PRODUCT-STABILIZING FLAPS**

[75] Inventor: **Joseph Goldman**, Plymouth, Minn.

[73] Assignee: **Federal Industries Corporation**, Plymouth, Minn.

[21] Appl. No.: **965,831**

[22] Filed: **Nov. 7, 1997**

[51] **Int. Cl.**[6] **B65D 5/06**

[52] **U.S. Cl.** **206/485**; 206/588; 206/524.5

[58] **Field of Search** 229/125.15, 125.04; 206/588, 589, 590, 524.1, 524.5, 485, 486

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,682,949	7/1954	Whitehead .	
3,062,367	11/1962	Holy .	
3,167,235	1/1965	Hailey et al. .	
4,219,149	8/1980	Stask	229/125.15 X
4,324,357	4/1982	Murkowski	206/485 X
4,394,905	7/1983	Hackenberg .	
4,821,847	4/1989	Uhlig .	
5,520,283	5/1996	Sutherland .	
5,577,614	11/1996	Palmeroni, Jr. et al.	206/588 X

OTHER PUBLICATIONS

Commercial Product: Corrugated boxes by various manufacturers with separate inserts in commecial use prior to 1997.

Primary Examiner—Jacob K. Ackun

Attorney, Agent, or Firm—James V. Harmon

[57] **ABSTRACT**

A single-piece corrugated box suited for shipping one or more articles, e.g. hazardous articles such as cans of paint, varnish, solvent or other liquid hydrocarbon includes four upright side wall panels that are connected by vertical fold lines and upper and lower pairs of abutting, full-overlap article-stabilizing flaps that are provided with punched openings therein positioned in vertical alignment with each other so that one pair of stabilizing flaps surrounds and interlocks over the upper end of the article and the other pair of stabilizing flaps surrounds and interlocks over the lower end of the article. Each pair of stabilizing flaps is supported exteriorally by a pair of laterally opposed end flaps which are folded centrally so as to enclose and abut the ends of the article as well as the underlying stabilizing flaps. The stabilizing flaps are hinged to the side walls of the box by horizontal fold lines. These fold lines form opposed anchoring points for the stabilizing flaps which cooperate with the interlocking of the stabilizing flaps over the article to strengthen and rigidify the box to enhance protection of the article that is packaged therein. The stabilizing flaps both extend horizontally in a straight line toward the article from the side wall to serve as a shock- and pressure-resisting brace between the article being shipped and the side wall of the box.

7 Claims, 6 Drawing Sheets

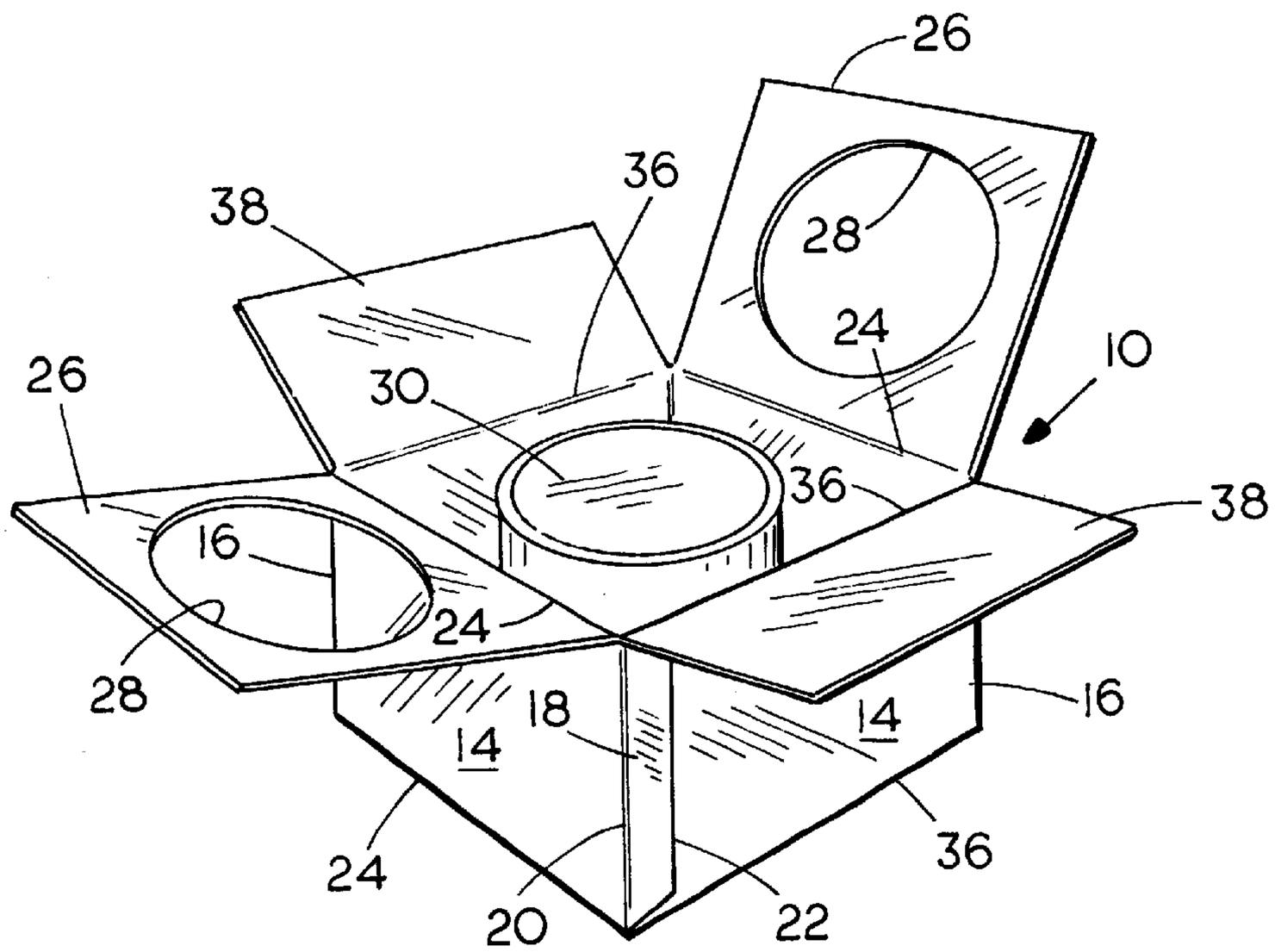


FIG. 1

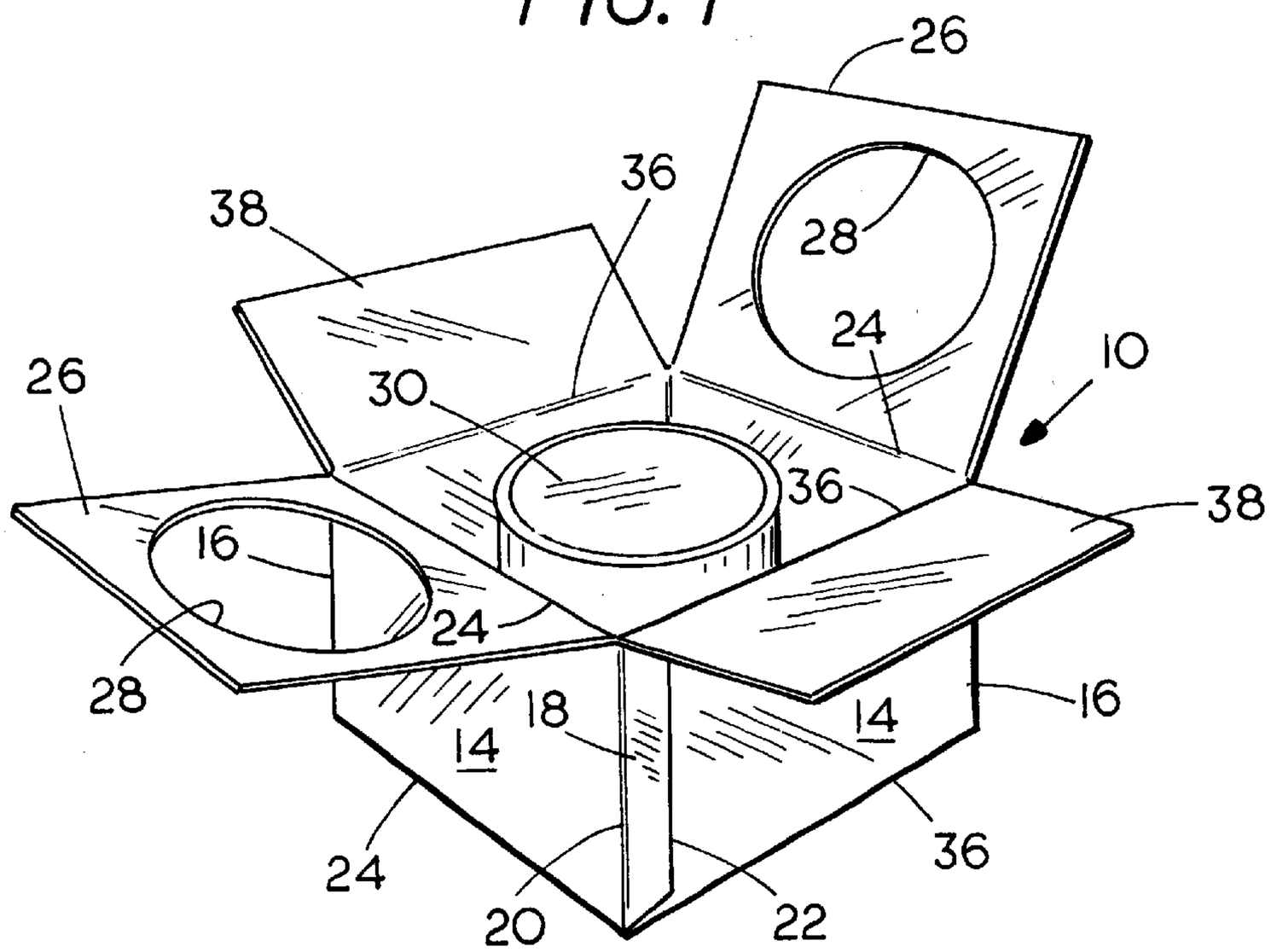

26
36
38
28
24
10
30
36
38
16
24
28
18
14
14
16
24
20
22
36

FIG. 2

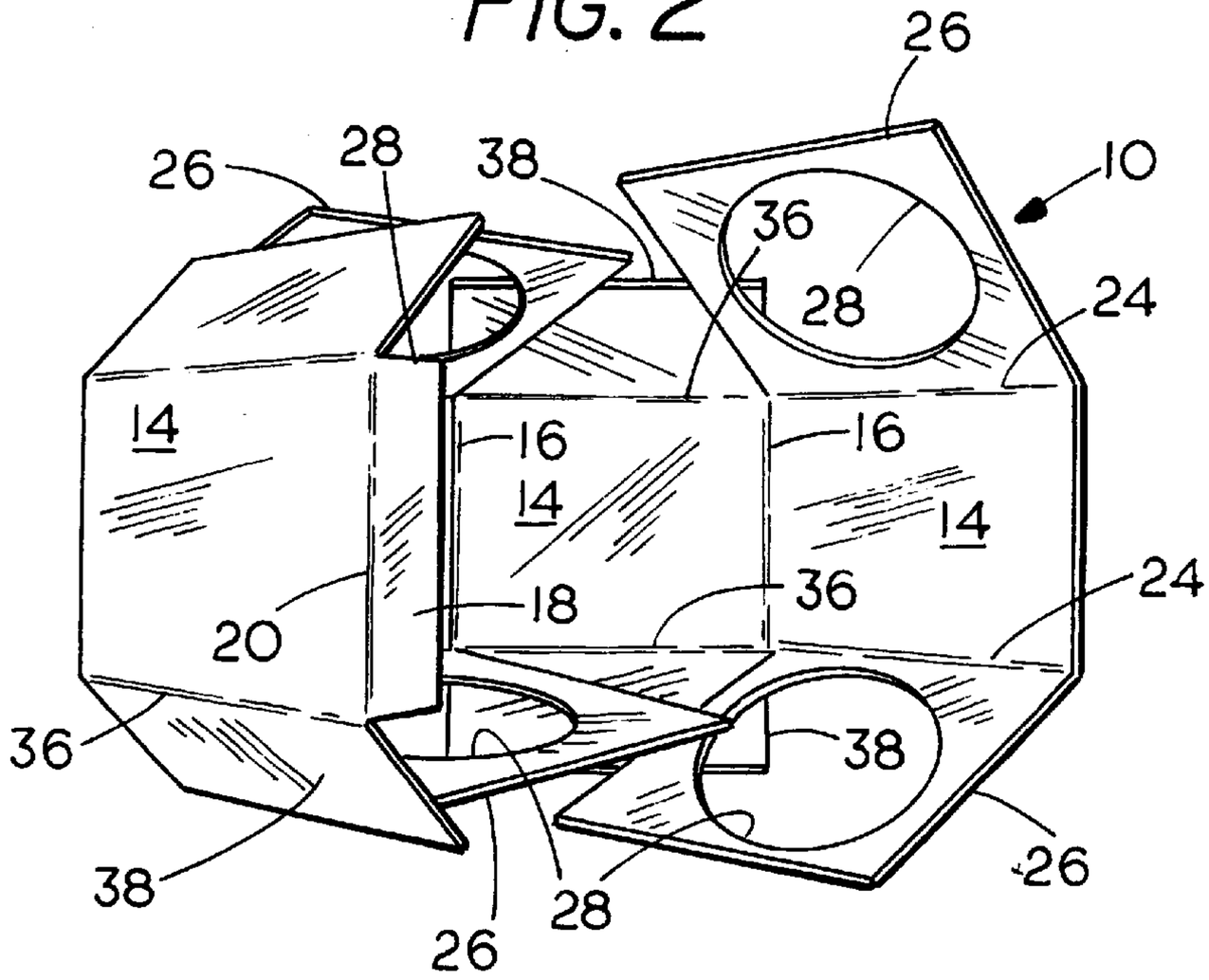

26
26
28
38
10
36
28
24
14
16
16
14
14
18
36
24
20
36
38
38
26
28
26

FIG. 3

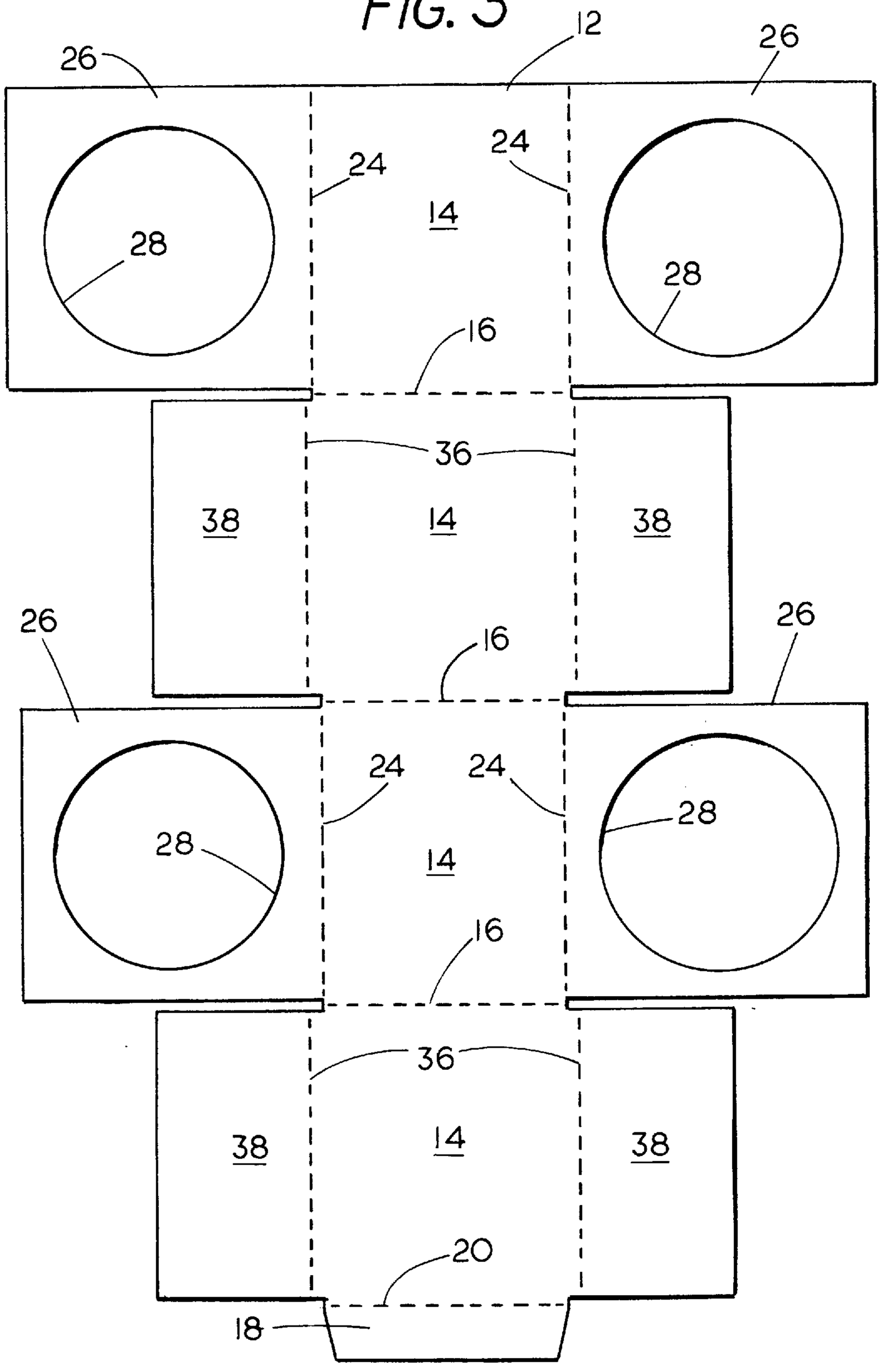

12
26
26
24
24
14
28
28
16
36
38
14
38
26
26
16
24
24
28
28
14
16
36
38
14
38
20
18

FIG. 3A

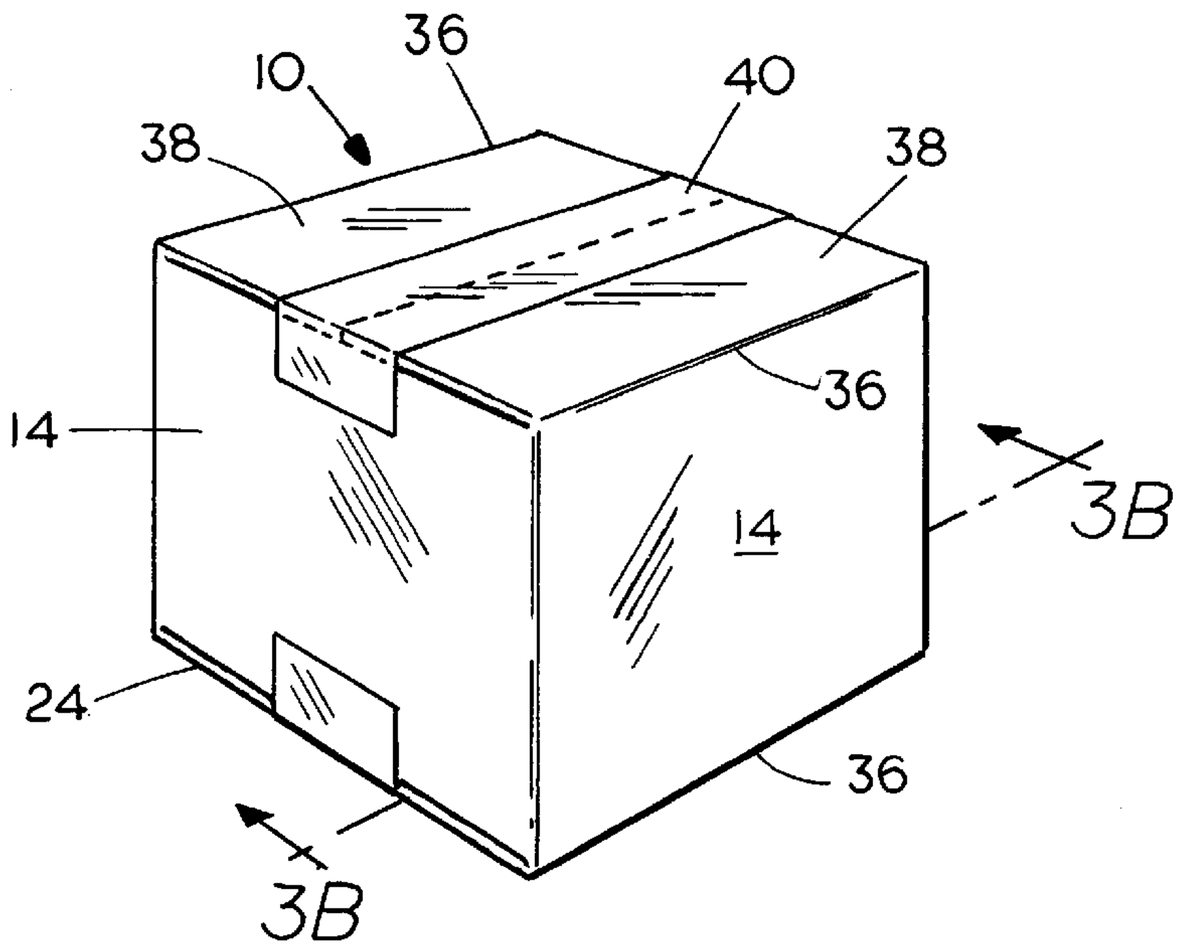

36
10
40
38
38
14
36
14
3B
24
36
3B

FIG. 3B

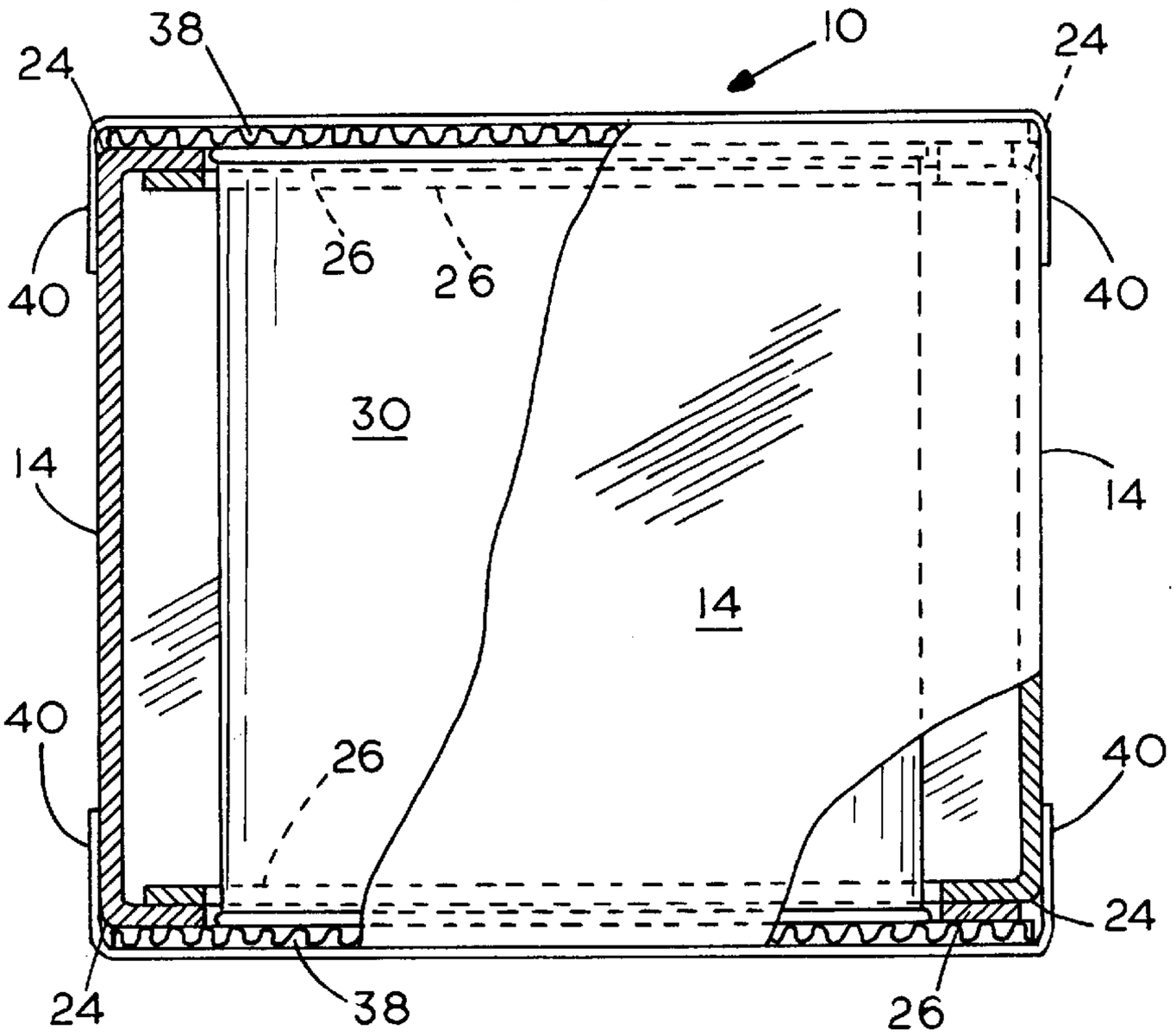

38
10
24
24
40
26
26
40
30
14
14
14
40
26
40
24
24
38
26

FIG. 4

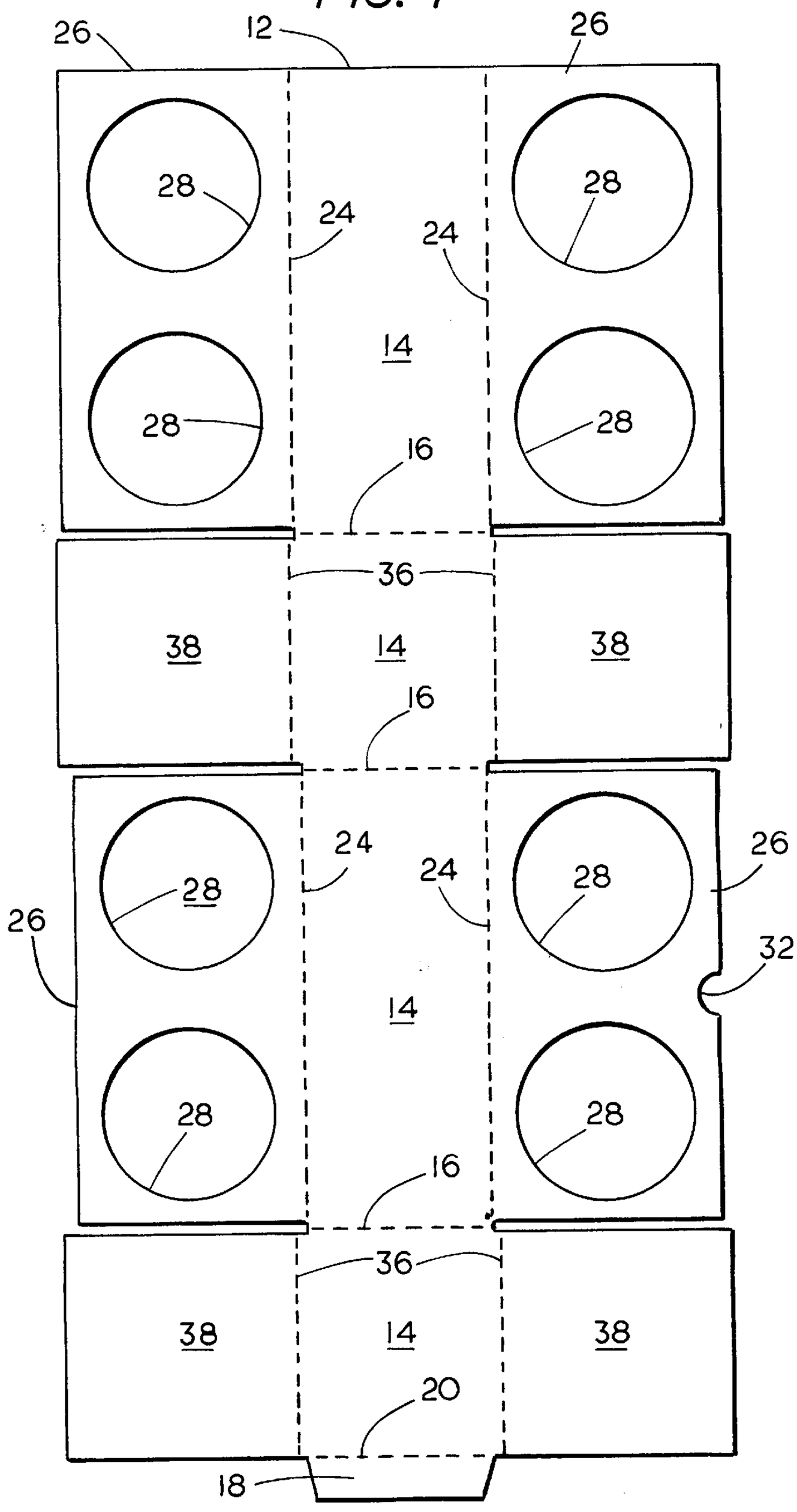

26
12
26
28
28
24
24
14
28
28
16
36
38
14
38
16
24
24
26
28
28
26
32
14
28
28
16
36
38
14
38
20
18

FIG. 5

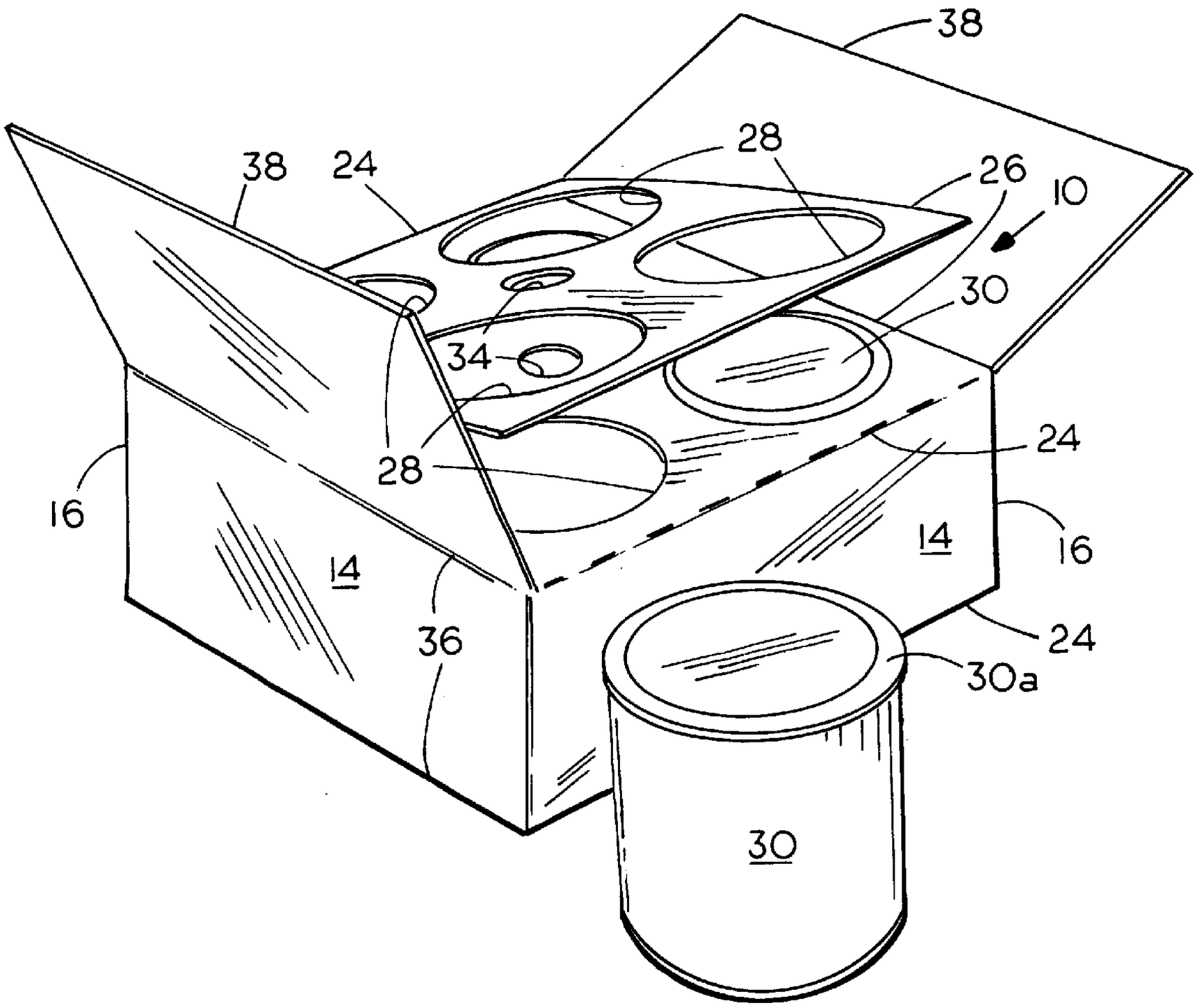
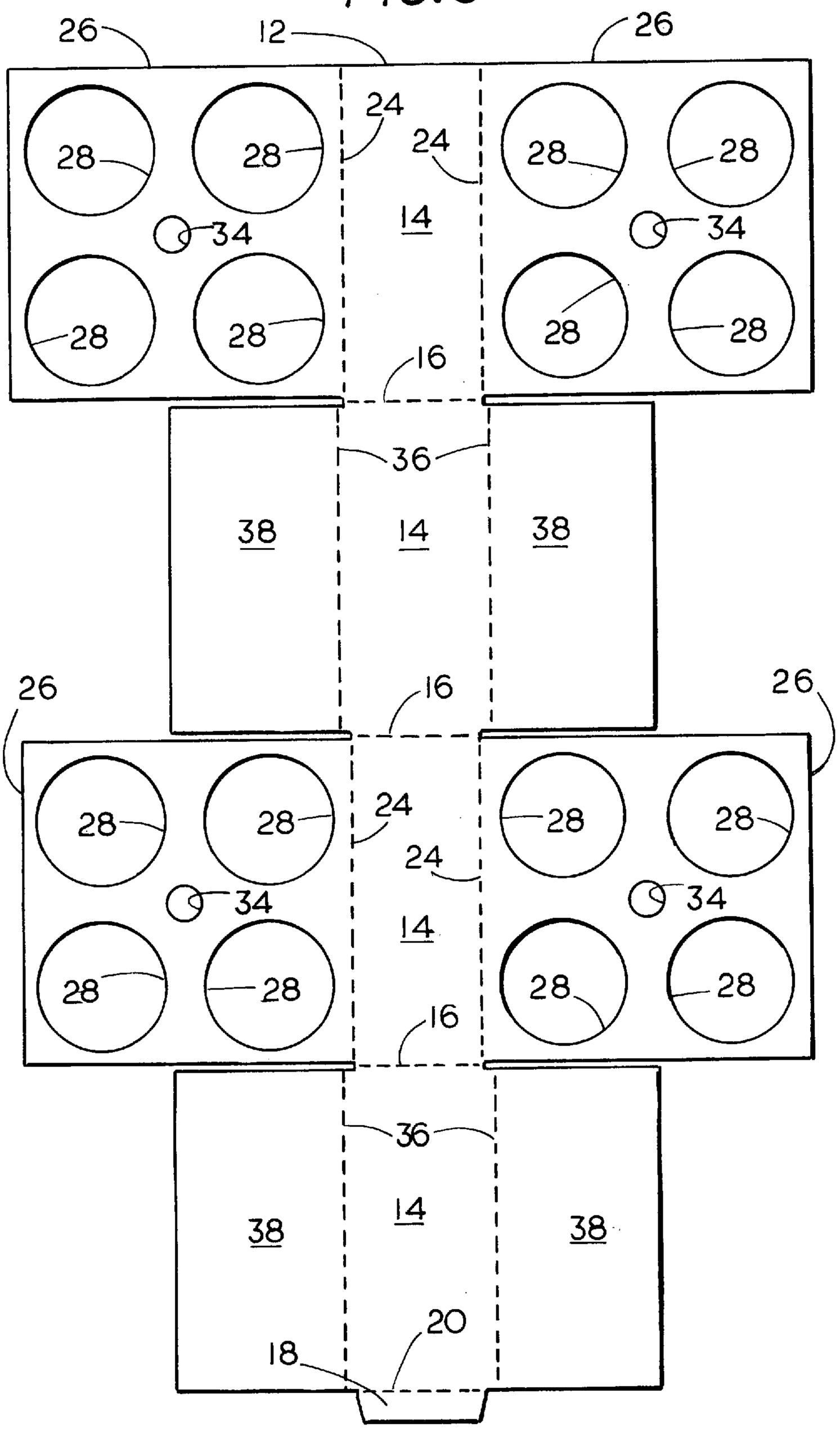


FIG.6


26
12
26
28
28
24
24
28
28
34
14
34
28
28
28
28
16
36
38
14
38
26
16
26
28
28
24
24
28
28
34
14
34
28
28
28
28
16
36
38
14
38
18
20

CORRUGATED BOX WITH EXTERIORALLY SUPPORTED PRODUCT-STABILIZING FLAPS

FIELD OF THE INVENTION

This invention relates to packaging and more particularly to folding boxes with integral stabilizing members.

BACKGROUND OF THE INVENTION

In recent years, suppliers and shippers have become increasingly concerned about safety in shipping hazardous materials such as paint, solvents, petroleum distillates, varnish, and other flammable liquids contained in metal cans, for convenience hereinafter referred to simply as "hazardous material." While these products have been shipped in boxes, the cost, convenience, and ease in filling and assembling the package have not been entirely satisfactory. Moreover, boxes that have been used in the past have sometimes failed to provide the best possible protection for the contents of the package. One previous package that was used in the past required several corrugated inserts consisting of separate pieces, each of which had to be handled separately and placed manually between the can of hazardous material and the walls of the corrugated box. Filling the box is time-consuming and requires four separate steps: the placement of the bottom spacers, the placement of the top spacers, the closing of the bottom of the box, and the closing of the top of the box. Furthermore, because the inserts consisted of separate pieces unconnected to other parts of the package, they had to be oriented and positioned entirely by hand.

In view of these and other deficiencies of the prior art, it is a primary object of the present invention to provide an improved shipping box which furnishes enhanced protection for hazardous materials at a cost equal to or below the cost of current packaging.

It is another object of the present invention to provide excellent protection for hazardous materials while achieving cost economies through a saving of paper.

A further object is to provide an improved protection for hazardous materials through the provision of more positive support by securely holding the contents in spaced relationship from the side walls of the box.

Another object of the invention is to provide a corrugated box for hazardous materials wherein the closing of the package is facilitated by the provision of product-retaining members that are self-orienting and self-positioning.

Yet another object of the invention is to provide an improved package for hazardous material that is formed from a single sheet of corrugated board and can meet or exceed applicable performance test requirements for both land and air shipment of hazardous materials.

These and other more detailed and specific objects of the present invention will be better understood by reference to the following figures and detailed description which illustrate by way of example but a few of the various forms of the invention within the scope of the appended claims.

SUMMARY OF THE INVENTION

The invention provides a single-piece corrugated box that is suited for shipping one or more articles, and is particularly well suited for shipping hazardous articles such as cans of paint, varnish, solvent or other liquid hydrocarbons. The box includes four upright side wall panels that are connected by vertical fold lines. Upper and lower pairs of abutting full

overlap article-stabilizing flaps are provided with punched openings therein that are positioned in vertical alignment with each other and interlocked over the article being shipped so that one pair of stabilizing flaps surrounds the upper end of the article and the other paid or stabilizing flaps surrounds the lower end of the article. Each pair of stabilizing flaps is supported exteriorally by end flaps, preferably consisting of a pair of laterally opposed half-flaps, i.e., end flaps which are folded centrally so as to meet along a center line for enclosing and abutting the ends of the article being shipped and the underlying stabilizing flaps. The stabilizing flaps, which are themselves devoid of fold lines, are hinged to the side walls of the box by horizontal fold lines. These fold lines form opposed anchoring points for the stabilizing flaps which cooperate with the interlocking of the stabilizing flaps over the article being shipped to strengthen and rigidify the box, thereby protecting the article that is packaged therein. The stabilizing flaps both extend horizontally in a straight line toward the article from the fold line to provide a lateral shock- and pressure-resisting brace between the article being shipped and the side wall of the box. Contact between the stabilizing flaps and the overlapped end flaps provide additional support for the stabilizing flaps exteriorally to further strengthen and immobilize the stabilizing flaps at each end of the package.

THE FIGURES

FIG. **1** is perspective view of a box in accordance with the invention for holding a single can.

FIG. **2** is a perspective view of the box of FIG. **1** as it appears just prior to assembly by the box-maker.

FIG. **3** is a plan view of the box blank used in FIGS. **1–2**.

FIG. **3A** is a perspective view of the box shown in FIGS. **1** and **2** after being filled and sealed.

FIG. **3B** is a side elevational view partly in section taken along lines **3B—3B** of FIG. **3A** but on a larger scale.

FIG. **4** is a box blank in accordance with the invention for holding two cans.

FIG. **5** is a perspective view of a corrugated box in accordance with the invention for holding four cans of equal size, and

FIG. **6** is a plan view of the box blank used in making the box of FIG. **5**.

DETAILED DESCRIPTION OF THE INVENTION

The invention will be described by way of example in connection with shipping metal paint cans containing a hazardous substance, e.g., paint, varnish, solvent and the like even though it is well adapted for other applications. The box can be suited for shipping any number of articles, typically from one to six articles, e.g. one to four one-gallon cans, six one-quart cans or six one-pint cans, and can be made in various sizes. For example, a box for one article is illustrated in FIGS. **1–3B**, a box for two articles is illustrated in FIG. **4**, and a box for four articles is illustrated in FIGS. **5** and **6**.

A box **10** in accordance with the invention is formed from a stamped blank **12** composed of corrugated paperboard. The blank **12** is provided with four upright, that is to say vertical, panels **14** connected by fold lines **16** and a connecting tab **18** which is connected to an adjacent panel **14** by means of a fold line **20**. The connecting tab **18** is bonded, e.g. by means of adhesive such as hot-melt, resin emulsion or sodium silicate adhesive, at the box factory to provide a

box-maker's connection **22** between two adjacent panels **14** at opposite ends of the blank **12**. If desired, the tab **18** can be replaced with another suitable form of seal for certain applications, such as a strip of reinforced tape or the like. At this stage the ends of the box are not folded shut, and the blank **12** which is now in tubular form can be collapsed and shipped flat to a customer to be filled and sealed.

Extending horizontally from hinges defined by horizontal fold lines **24** at both the top and bottom of the box **10** are upper and lower pairs of full-overlap article-stabilizing flaps **26**, each of which is provided with a punched opening **28** of just sufficient size to fit over the end of an article, e.g. a can of paint **30** which is being shipped in the box **10**. As already mentioned, the box **10** can be sized to fit any number of articles. This is accomplished by providing different numbers of openings in the stabilizing flaps **26**: one opening for a single article **30** in the case of FIGS. **1–3**B, two openings **28** in the case of FIG. **4**, and four openings **28** in the case of FIGS. **5–6**. During use, the stabilizing flaps **26** are folded inwardly, i.e. centrally, to a horizontal position about the hinges defined by the fold lines **24** so that the punched openings **28** surround the ends of the article **30** that is being shipped. Thus, the flaps **26** are interlocked around the article **30** (FIG. **3**B). It will be seen that the stabilizing flaps **26** are connected by means of the fold lines **24** to panels **14** on opposite sides of the box **10** with the stabilizing flaps **26** extending toward one another from opposing sides of the box **10**. If desired, the fold lines **24**, in addition to being compressed, can also be provided with serrations such as ⅜" serrations spaced ⅜" apart to make the flaps **26** easy to fold. Some or all of the stabilizing flaps **26** can be provided with punched finger openings or slots **32** (FIG. **4**) or **34** (FIG. **6**) to help a person lift or position the flaps **26** manually.

Connected to the remaining wall panels **14** by means of laterally spaced apart, horizontally disposed fold lines **36** are upper and lower pairs of end flaps **38**. As best seen in FIG. **3**B, the end flaps **38** are folded centrally on the fold lines **36** to a horizontal position overlapping the stabilizing flaps **26** at both the top and bottom of the box **10**. Consequently, each pair of stabilizing flaps **26** is supported exteriorally by the laterally opposed end flaps **38** that contact and enclose both ends of the article **30** and the underlying stabilizing flaps **26** (FIG. **3**B). The end flaps **38** thus function as half-flaps that are folded centrally so as to meet along a center line at each end of the box **10**. FIG. **3**B also shows how the fold lines **24** between the stabilizing flaps **26** and the side wall panels **14** form opposed anchoring points for the stabilizing flaps **26** which cooperate with the interlocking of the stabilizing flaps by the article **30** for strengthening and rigidifying the box **10** to provide improved protection for the article **30** packaged therein. Thus, the stabilizing flaps **26** both extend horizontally in a straight line toward the article **30** from the fold lines **24** at one edge thereof so as to act as a shock- and pressure-resisting brace between the side walls **14** and the article **30** being shipped. Contact between the stabilizing flaps **26** and the overlapped end flaps **38** supports the stabilizing flaps **26** exteriorally to further strengthen and immobilize the stabilizing flaps at each end of the box **10**.

Many variations are possible. If the articles **30** being shipped are cans of paint, varnish or the like, the can lids can be held in place, if desired, by means of lid-retaining plastic rings such as polyethylene rings **30***a* (FIG. **5**) sold under the trademark Armlok® by The Armstrong Container Corporation. The plastic rings **30***a* are pressed onto the tops of the cans **30** and each includes a lid-retaining lip located over the edge of the can lid for holding the lid in place on the can. The Armlok® rings **30***a* are especially useful in meeting the requirements of shipping hazardous material by air. However, the invention can be used with or without the retaining rings **30***a*. If the rings **30***a* are used, the punched openings **28** should be sized to accommodate them. To make the stabilizing flaps **26** easy to fold down, the punched openings **28** should have a small clearance, e.g. about 1/32" between the article **30** and the surrounding edge of the opening **28**. However, in certain applications it may be desirable to provide a friction, i.e. interference, fit between the can and the edge of the opening **28**.

After the article **30** that is being shipped in the box **10** is enclosed and all of the flaps **26** and **38** are folded down to a horizontal position as shown in FIGS. **3**A and **3**B, the box **10** is taped shut by means of a suitable packaging tape such as a 3"-wide strip of pressure-sensitive tape **40** of any suitable known construction (FIGS. **3**A and **3**B) covering the joint between the flaps **38** at both the top and bottom of the box **10**. However, it is contemplated within the scope of the invention to replace the pressure-sensitive tape **40** with a suitable adhesive such as a hot-melt adhesive applied between the flaps **38** and the underlying stabilizing flap **26** at both the top and bottom of the box **10**.

It will be noticed that the box **10** of the present invention is easy to assemble since no extra parts or inserts are required, and that the stabilizing flaps **26** are entirely self-orienting and self-positioning by virtue of their hinged connected at **24** to the side walls **14**, thus facilitating assembly. In addition, the invention provides a more secure and stable packaging of the article **30** since both stabilizing flaps **26** of each cooperating pair extend horizontally in a straight line toward the article **30** from the fold line **24** to provide a shock- and pressure-resisting brace between the side wall **14** and the article **30** that is being shipped. The physical contact between the pair of stabilizing flaps **26** and the end flaps **38** provides further support for the stabilizing flaps exteriorally to strengthen and immobilize the stabilizing flaps **26** at each end of the box **10**. It can also be seen in FIG. **2** that, since the stabilizing flaps **26** engage the top and bottom ends of the article **30** rather than some point closer to the center of the article, the box **10** is better able to resist torque forces that occur when the box is dropped on its side. Thus, positioning the stabilizing flaps **26** at the top and bottom ends of the box **10** provide greater strength.

Besides providing better protection for the contents, the box **10** can be produced at a lower cost than boxes used heretofore since there is saving in paper. They also provide a saving in time and labor required for assembly. Thus, when the stabilizing flaps **26** are folded down they position themselves automatically around the ends of the article, e.g. paint can **30**, by virtue of the hinge connection at **24** to the side walls **14**. Consequently, the invention provides greater strength and product protection while reducing overall packaging costs.

Boxes in accordance with the invention can be constructed from any suitable corrugated paperboard. For example, in packaging four one-gallon cans, the box **10** can be formed from a sheet of 350 lb. test double-wall corrugated board. To ship one or two one-gallon cans of paint, the blank **12** can be composed of 275 lb. test double-wall or single-wall corrugated board. However, the invention is not limited to a particular form of corrugated paperboard; other materials and even plastic sheet material can be used for certain applications.

The invention provides outstanding performance and exceeds the shock, vibration and drop test requirements of the International Safe Transit Association tests, as well as the United Nations Package Performance Test.

Many variations of the present invention within the scope of the appended claims will be apparent to those skilled in the art once the principles described herein are understood.

What is claimed is:

1. A single-piece corrugated box suited for shipping one or more articles comprising,

four upright side wall panels connected together by vertical fold lines,

upper and lower pairs of full-overlap article-stabilizing flaps that extend centrally from horizontal fold lines that connect said flaps to opposing upright side walls,

said stabilizing flaps having punched openings therein that are positioned in vertical alignment with each other so that one pair of stabilizing flaps surrounds the upper end of the article and the other pair of stabilizing flaps surrounds the lower end of the article,

each pair of stabilizing flaps is supported exteriorally by at least one end flap that is folded centrally so as to enclose the ends of the article and the underlying stabilizing flaps,

the horizontal fold lines between the stabilizing flaps and opposed side wall panels form anchoring points on opposite sides of the package for the stabilizing flaps that cooperate with an interlocking of the stabilizing flaps around the article being shipped to strengthen and rigidify the box to thereby enhance protection of the article packaged therein,

the stabilizing flaps are devoid of fold lines and extend horizontally in a straight line toward the article from said horizontal fold lines to provide a shock- and pressure-resisting brace between the side wall connected thereto and the article being shipped, and

contact between the stabilizing flaps and the overlapped end flaps supports the stabilizing flaps exteriorally to strengthen and immobilize the stabilizing flaps at both the top end and the bottom end of the box.

2. The box of claim **1** wherein the box is formed from single-wall or double-wall corrugated paperboard.

3. The box of claim **1** wherein the end flap comprises a pair of cooperating centrally folded half-flaps secured in overlapping position in contact with an underlying stabilizing flap by a strip of tape that is wrapped around the box.

4. The box of claim **1** wherein each of the stabilizing flaps is provided with a single opening and each of the openings is aligned for enclosing a single article within the box.

5. The box of claim **1** wherein each of the stabilizing flaps is provided with multiple openings and each of the openings is aligned with a corresponding opening in an adjacent flap for packaging multiple articles in said box and the top and bottom ends of each article extending through openings provided in product-stabilizing flaps at the top and bottom of the box and the ends of the article abut the end flaps.

6. The box of claim **1** wherein the article is a metal can containing paint, varnish, solvent or other hazardous substance, and the punched opening in each stabilizing flap comprises a circular opening sized to fit the can.

7. The corrugated box of claim **1** for use in combination with said article wherein,

said article comprises a can,

the punched openings in the stabilizing flaps are of just sufficient size to fit around each end of the can so as to surround the ends of the can for bracing the can laterally, and

the can has top and bottom ends that abut inside surfaces of said end flaps at each end of the box.

* * * * *